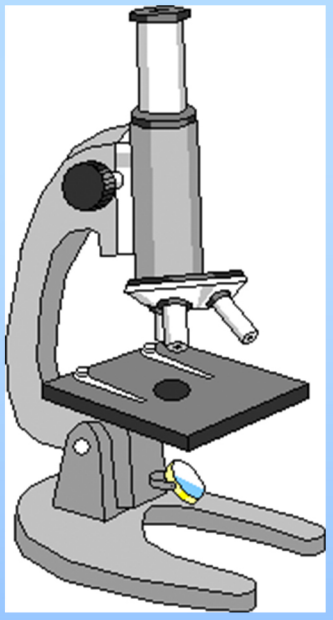
Preparatory Manual for Physiotherapy Students



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Preface

The author is an MBBS, MD Microbiologist, working as an assistant professor in the department of Microbiology at ACS Medical College and Hospital,Chennai. The author was inspired by her father, Late Mr.S.Easwaran (a school teacher) who always used to help weaker students and encourage them in studies.

This manual is focussed mainly on para medical courses which include physiotherapy, allied health sciences and nursing. This manual emphasises on short questions which most students don't know how to write, although the provide an opportumity to score high.

I owe my publication to my beloved parents without whom I would not be here, and my family who have always encouraged me. I would also like to thank my mentor Dr.Balasubramaniam, ENT surgeon who is the back bone for this manual.

The author ,Dr.E.Subbalakshmi is currently working as an Assistant Professor in the department of Microbiology, ACS Medical College and Hospital, Chennai. She graduated with an MBBS degree from Kilpauk Medical College, Chennai in1990.Being an active clinician, her interiest in research motivated her to pursue her MD in Microbiology in her late 40s. Her passion for teaching, instilled in her by her father who was an emminent Chemistry teacher is what led to the publication of this manual.

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General Microbiology.

1.Hisory of Microbiology

1.List the contributions of Louis Pasteur.
The contributions of Louis Pasteur are pasteurization, discovery of rabies virus vaccine, hot air oven, autoclave, meat broth for culture.

2.Koch's postulates.
a. The bacterium should be constantly associated with the lesions of the disease.
b. It should be possible to isolate the bacterium in pure culture.
c. Inoculation of such pure culture into a suitable laboratory animals should produce lesions of the disease.
d. It should be possible to re-isolate the bacterium in pure culture from the lesions produced in the experimental animals.

3.Mention different types of microscopes.
a. Compound microscope
b. Fluorescent microscope
c. Electron microscope
d. Dark field microscope

2.Morphology and Physiology of Bacteria

4.Classify bacteria on the basis of shapes
Bacteria can be classified into various groups based on their shapes
Cocci—spherical or oval shaped cells. e.g Staphylococcus sp.,Micrococcus.sp.
Bacilli---rod shaped eg Escherichia coli,Klebsiella pneumoniae.
Cocco bacilli—small ovoid shaped eg. Acinetobacter baumanii.
Vibrio—comma shaped .eg. Vibrio cholerae
Spirochaete---- flexuous spiral shape.eg. Treponema
Spirilla--- Rigid spiral forms.eg Spirillum minus
Actinomycetes--- branching filamentous forms eg Actinomyces.

5.Mention different types of bacterial stains.
a. Simple stain
b. Differential stain
c. Negative stain
d. Fluorescent stain

6.Negative stain.
Negative stain is used to demonstrate the capsule of the bacteria. Here the background gets stained and the unstained bacterial capsule stand out in contrast. Eg.India ink to demonstrate capsule of S.pneumoniae.

7.Gram stain procedure.
Gram stain is a differential stain to differentiate gram positive and gram negative bacteria.
Step1—Primary stain. Crystal violet for 1min.Water rinse.
Step2—Gram's iodine for 1min. Water rinse.
Step3-Decolorisation ---Acetone for 2-3 seconds or 95% ethyl alcohol for 20-30 sec. Water rinse immediately.
Step4- Counter stain—Safranin for 30-60 seconds. Water rinse and blot. Examine under oil immersion .

8.Simple stain.
Basic dyes such as methylene blue or basic fuchsin are used as simple stain.They impart the same color to all the bacteria in a smear.

9.Name any two differential staining methods.

a. Gram stain --- to differentiate gram positive and gram-negative bacteria
b. Acid fast stain to demonstrate Mycobacterium tuberculosis.

10.Bacterial cell wall.

1.It gives protection to the cytoplasm and its contents.
2.It takes part in cell division.
3.It gives shape to the cell.

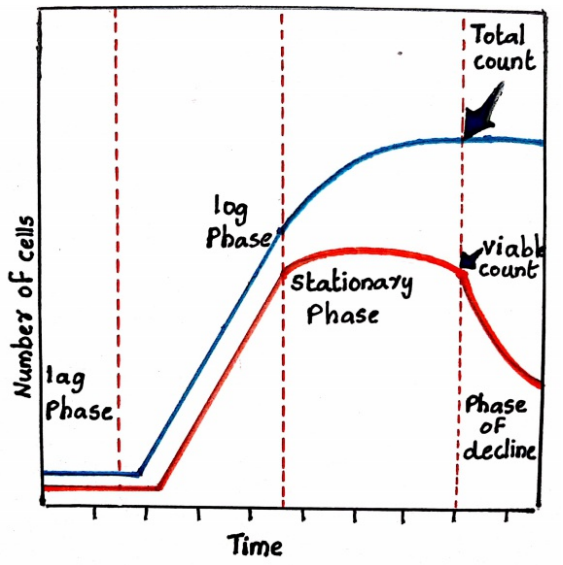
11.Give four differences between gram positive and gram-negative cell wall.

	Gram positive	Gram negative
Thickness	Thicker	Thinner
Teichoic acid	present	absent
Lipopolysaccharide	absent	present
Variety of amino acids	few	several

12.Different phases of bacterial growth curve.

a. lag phase
b. Log phase
c. Stationary phase
d. Decline phase

13.Draw the diagram of bacterial growth curve and label its parts.



14.Flagella

Flagella are organs of locomotion. All motile bacteria possess on or more long, unbranched hair like or thread like filamentous appendages called flagellae. Each flagellum has three distinctive parts—basal body, hook and filament.
Eg. Monotrichous—Vibrio cholerae
Peritrichous—Escherichia coli, Salmonella Typhi.
Amphitrichous—Pseudomonas aeruginosa.

15.Give some examples of motile and non-motile organisms.

Motile organisms
Escherichia coli
Pseudomonas aeruginosa
Vibrio cholerae
Non motile organisms.
Staphylococcus aureus
Klebsiella pneumoniae
Acinetobacter baumanii.

16.Hanging drop method.

Hanging drop method is a method done to detect the motility of bacteria.This can be done by emulsifying the bacterial colony in saline and examine under 40X using cavity slide.Look for the motility of the bacteria at the edge of the drop.

17.Detection of flagella.

Direct demonstration of flagella
Dark ground or phase contrast microscopy
Indirect demonstration of flagella
Hanging drop method
Mannitol motility medium.

18.Define plasmid.

Plasmids are extra chromosomal ds circular DNA molecules that exist in free state in the cytoplasm of bacteria.

19.Capsule.

Capsule is a glycocalyx which is a viscous, jelly- like material secreted by bacteria which surrounds the cell wall. When this glycocalyx is organized into a sharply defined structure and attached to the cell wall it is termed as capsule. Capsule can be either polysaccharide or poly peptide.
Eg Pneumococcus, Klebsiella pneumoniae, Meningococcus.

20.Name any two capsulated bacteria.
Streptococcus pneumoniae—polysaccharide capsule
Bacillus anthracis—Polypeptide capsule

21.Quellung reaction
The capsule of a bacteria is antigenic and therefore the antigenic reaction can be demonstrated by serological methods. When a suspension of capsulated material is mixed on a slide with a drop of type specific anticapsular serum and loopful of methylene blue solution and examined under microscope, capsule becomes swollen refractile and prominent.

22.Demonstration of capsule.
Capsule can be demonstrated by various methods
a.Negative staining by India ink and nigrosin stain.
b.M'Faydean capsule stain. Used for the demonstration of Bacillus anthracis.

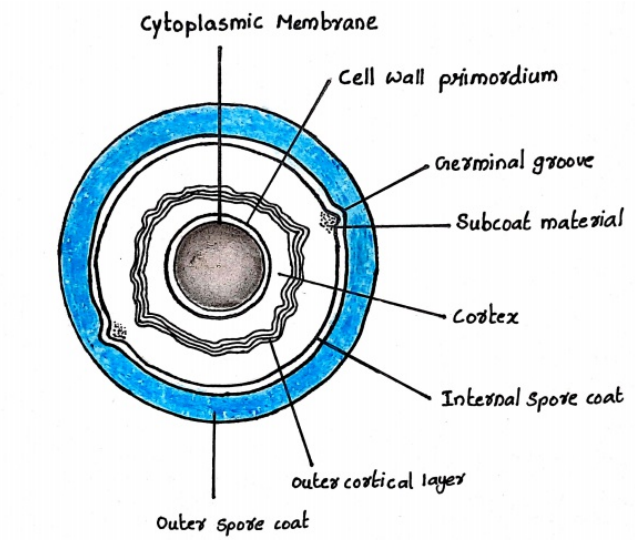
23.Function of capsule.
1.Capsule contribute to bacterial virulence.
2.Protects the bacterium from phagocytosis.
3.Prevents cell from drying out.

24.Define fimbriae.
Fimbriae are organelles of adhesion. They are finer, shorter, straight, thinner, non-helical hair-like surface appendages which protrude from the cell envelope. They are classified into common pili and sex pili and col I pili.

25.Functions of fimbriae.
Fimbriae are called organs of adhesion.
Fimbriae contribute to virulence of bacteria.

26.Types of fimbriae.
Different types of fimbriae.
Common pili.—there are 6 types of common pili.
Sex or F (fertility pili)—Sex pili help in bacterial conjugation.
ColI (colicin pili).

27.Draw a neat diagram of bacterial spore.



28.Bacterial endospore.
Bacterial spores are highly resistant, resting dormant forms. They are formed inside the cell, hence called endospores. Each bacterium forms one spore, which on germination forms a single vegetative cell.
Eg. Bacillus anthracis, Clostridium tetani, Clostridium perfingens.

29.Give some examples of spore forming bacteria.
Gram positive spore forming bacilli—Bacillus anthracis.
Gram negative spore forming bacilli—Clostridium perfingens, Clostridium tetani.

30.Application of bacterial spores.
Spores of non toxigenic strains of Clostridium tetani—Sterilisation control for hot air oven.
Spores of Bacillus stearothermophilus---sterilisation control for autoclave.

31.Give some examples of aerobic and anaerobic bacteria.
Aerobic bacteria--Staphylococcus aureus, Escherichia coli, Klebsiella pneumoniae.
Anaerobic bacteria---Clostridium perfingens, Clostridium tetani, Bacteroides fragilis.

32.Mention the factors affecting the growth of bacteria.
Oxygen, carbon di oxide, light. pH, Temperature, moisture and dessication are the factors affecting the growth of bacteria.

3.Sterilization and Disinfection

33.Define sterilization.
Sterilization is defined as a process by which an article, surface, object, culture medium, specimen or materials is freed from all types of living microorganisms including spores.

34.Define disinfection.
Disinfection is defined as destruction of pathogenic microorganisms or organisms capable of causing infection.

35.Disinfectants.
Disinfectants are chemical substances that are used for disinfection. They are chemical agents used for destruction of pathogenic microorganisms but not spores.
Eg. Glutaraldehyde, hypochlorite, Ethyl alcohol.

36.Antiseptics.
Antiseptics are chemical substances which can be applied to living tissues to prevent infection.
Eg. Dettol, Savlon

37.Hot air oven
Hot air oven is the most widely used and best method of dry heat sterilization. The temperature used for sterilization is 160 deg 2 hours. All glass articles, powders, oils can be sterilized by this method.

38.Mention the materials that can be sterilized by hot air oven.
All glass articles, sterile glass tubes, powders, oils etc.

39.What is the holding time of hot air oven?
The holding time used in hot air oven to sterilize material is 160 deg for 2 hrs.

40.Incineration
It is an efficient method for sterilization and disposal of hazardous infectious hospital waste. They are burnt to ashes at temperatures of 870 deg – 980 C in an incinerator by electricity.
Eg. Dressings, pathological materials, animal carcasses.

41.Mention the different types of sterilization by moist heat.
Pasteurisation---sterilization below 100 deg C
Boiling----sterilization at 100 degC
Autoclave—sterilization above 100 degC

42.Pasturisation.
Pasturisation is used to kill microorganisms present in milk in dairy industries. It reduces microbial count and does not kill spores. There are three methods of pasturization.
Holder method –milk is heated to 63 deg for 30 min followed by cooling to 13 deg.
Flash method—milk is heated to 72 deg followed by sudden cooling to 13 deg.
Ultra-high temp—milk is heated to 130 deg for 1 or 2 sec and then suddenly cooled.

43.How are the vaccines disinfected?
Vaccines are disinfected using water bath at 60deg for 1hour.

44.Tyndallisation.
Tyndallisation is also known as intermittent sterilization or fractional sterilization. It is done by heating to 100 deg C for 30 min on 3 successive days. The principle is that first exposure kills all vegetative bacteria and spores if present will germinate and will be killed on 2nd and 3day heating.
Eg. Sugar media, gelatin, milk.

45.Insipissation.
It is a process of sterilising an article at 80 to 85 deg C for 30 min for 3 consecutive days.by a special instrument called insipissator.
Eg.Dorset egg media, Lowenstein jensen media for Mycobacterium tuberculosis

46.Mention the different types of articles sterilized by autoclave.
Surgical dressings, surgical instruments, culture media, discarded media with growth, clothing-apron, gowns, masks, bed sheets etc.

47.Mention the holding time of autoclave.
The holding time of Autoclave –121 deg 15lb/sq.in/15 min

48.List the properties of chemical disinfectant
a.Disinfectant should have a wide spectrum of

activity and should be effective against all microorganisms.
b.Should be stable
c.Should be effective in acid as well as alkaline media.
d.Be effective in the presence of organic matter.
Eg.Glutaraldehyde, iodine, phenol.

49.Name four disinfectants used in the hospital.
The four disinfectants used in the hospital are phenolic disinfectant, hypochlorite, lyzol, and glutaraldehyde.

50.Give some examples of gaseous disinfectants.
Ethylene oxide, Formaldehyde, beta propiolactone.

51 Name four types of bacterial filters.
1.Candle filter,
2.Asbestos disk filter,
3.Sintered glass filter.
4.Membrane filter.

52.Cold sterilization
Cold sterilization is a process in which sterilisation is carried out at low temperatures with the help of chemicals, radiation, membranes excluding temperatures.
Eg ionizing radiation ---X rays, Gamma rays.
Non -ionising radiation—UV rays.

53.Mention two types of ionizing radiation used for sterilization
Ionising radiation—Xrays, Gamma rays.
Non ionising radiation—UV rays.

54.Give some examples of alcohols that can be used as disinfectants.
Rectified spirit(ethyl alcohol) for disinfection of thermometer.
Methyl alcohol for cleaning the incubator.

55.Give some examples of aldehydes used as disinfectants.
Formaldehyde used for disinfection of theatre.
Glutaraldehyde for disinfection of instrument.

56.Give some examples of halogens used as disinfectants.
Povidone iodine --used as disinfection for wounds
Chlorine--- used as a disinfection for swimming pool and also for disinfecting laboratory instruments.

57.Mention the method of sterilization of following items.
Disposable syringes—ionising radiation.
Operation theatres—UV rays.
Clinical thermometer—rectified spirit.

4.Culture media and Culture methods

58.Mention the different types of culture media.
Liquid media.
Solid media.
Semi solid media.

59.Define nutrient agar.
Nutrient agar is the simplest and basal medium used routinely in microbiology laboratory to grow non-fastidious bacteria. It is composed of peptone, meat extract, Nacl, Agar 2%.It can be used to study colony characteristics and to maintain stock culture,

60. Enriched media.
A simple medium is enriched by substances such as blood, serum, egg. Enriched media are used for cultivation of bacteria that possess fastidious growth requirements.
Eg. Blood agar—for cultivation of streptococci.
Chocolate agar – for cultivation of Haemophilus.

61.Enrichment media.
Enrichment media are essentially liquid media containing specific nutrients, which cause enrichment of required pathogenic bacterium and inhibit growth of unwanted (commensal) bacteria, from a mixture of organisms from feces, sputum.
Eg. Selenite-F broth for enrichment of typhoid and paratyphoid bacilli from fecal samples.
Tetrathionate broth—for enrichment of Salmonella species from feces.

62.Transport media.
They are used in case of delicate organisms which may not survive or may be overgrown by non-pathogens during the time it takes to transport specimen to the laboratory.
Eg. Stuart's transport medium for gonococci.
Cary-Blair medium for Vibrio cholerae.

63.Selective media.
Selective media are solid media, in which chemical substances are incorporated, which promotes the growth of required pathogens selectively and suppress the growth of unwanted (commensal) bacteria.
Wilson and Blair's bismuth sulphite agar—for isolation of typhoid and paratyphoid bacilli from feces.
Lowenstein-jensen medium for isolation of tubercle bacilli.

64.Differential or indicator media.
Differential media are those in which chemical substances are incorporated to bring out different characteristic of different bacteria so that colonies of one particular species can be differentiated from those of another.
Eg Mac conkey agar. Lactose fermenting colonies will appear pink in colour. Eg E.coli,Klebsiella pneumoniae.
Non lactose fermenting colonies—will form colorless colonies. —eg. Salmonella spp, Shigella spp.

65. Anaerobic media.
Anaerobic media are used for cultivation of anaerobic bacteria. These media contain a reducing substance that absorbs all oxygen and creates an anaerobic condition, which favours growth of anaerobes.
Eg. Robertson's cooked (chopped) meat (RCM) broth.
Thioglycollate medium.

66. Name two selective media and two enriched media.
Enriched media: Blood agar, chocolate agar.
Selective media; Wilson and Blair's bismuth sulphite agar- for isolation of typhoid and paratyphoid bacilli from feces.
Lowenstein Jensen medium –For isolation of tubercle bacilli.

67.Name any four-transport media.
1.Stuart's transport medium for gonococci.
2.Cary-blair medium for Vibrio cholerae
3.Pike's medium for Streptococcus
4.VR- Venkatraman Ramakrishnan medium for Vibrio cholerae

68.Mention the different methods of streaking of culture?.
Streak culture, stroke culture, stab culture, lawn or carpet culture.

69.what are the different methods of anaerobic culture?

Mcintosh and Filde's anaerobic jar, Gas Pak system, anoxomat instrument, Robertson cooked meat broth and Thio glycollate broth. These are the different methods used to produce anaerobic environment for the organisms.

5.Bacterial Genetics, Antibacterial agents and Susceptibility tests

70.Define transduction.

Transduction is defined as transmission of a portion of DNA from one bacterium to another by bacteriophage.

71.Conjugation.

Conjugation refers to the transfer of genetic material from one bacterium to another by mating or contact with each other and forming the conjugation tube.

72.Define antimicrobial agents.

Antimicrobial agents are agents that kill or inhibit the growth of microorganisms.

73.Different classes of antimicrobial agents.

Drugs acting on cell wall—penicillin, Cephalosporins
Drugs acting on protein synthesis inhibition—Aminoglycosides,Tetracyclines
Nucleic acid synthesis inhibition----- Fluroquinolones,Metronidazole

74.Define antibiotics.

Antibiotics are natural substances produced by certain groups of microorganisms.

75.Define antimicrobial susceptibility testing.

Antimicrobial testing is done only for pathogenic bacteria to assess the susceptibility to antimicrobial agents. Mueller hinton medium is considered as the best medium to use for routine susceptibility testing. Disc diffusion method is the most widely used. The test bacterium is inoculated on the solid medium and the antibiotic discs are applied. The antibiotic in the disks diffuses through the solid medium, so that the concentration is highest near the site of application of the antibiotic disk and decreases gradually away from it.

76.Define term bactericidal and bacteriostatic and give examples.

Bactericidal-Antimicrobial which are able to kill microorganisms are called bactericidal. eg. Penicillin, Cephalosporins.
Bacteriostatic—Antimicrobial agents which are able to inhibit the microorganisms are bacteriostatic,.Eg, Tetracyclines.

6.Infection and Immunity

77. Define infection.
The lodgement and multiplication of a parasite in or on the tissues of a host constitutes infection.

78.Subclinical infection.
Entry, lodgement and multiplication of an infectious agent in the body of man and animals is called infection. Infection may or may not lead to disease. Subclinical infection is where the typical clinical manifestation of disease is absent.

79.Define cross infection and subclinical infection.
Cross infection is defined as when a patient is suffering from disease, a new infection is set up from another host or exogenous source.
Subclinical infection. It is an infection that is active but does not produce noticeable symptoms.

80.Opportunistic infection.
When the host resistance is impaired, as in immunocompromised patients, a nonpathogenic microorganism may set up infection which is known as opportunistic infection.
Eg. Opportunistic infections are very common in AIDS due to immunodeficiency.

81.Nosocomial infection/hospital -acquired infection.
Cross infections in hospitals are called hospital-acquired infection. These infections were not present at the time of their admission and they develop infection 48 hours after their admission in the hospital.

82. Mention the different modes of spread of infection.
The microorganisms causing infection can spread from the reservoir or source by inhalation, ingestion, air- borne transmission, inoculation, vertical transmission, vector borne, transmission of blood borne infection through physical contact.

83.Endemic.
The infections that occur at a persistent usually low level in a certain geographical area are called endemic.

84.Epidemic.
The infections that occur at a much higher rated than usual in a particular geographic area is known as epidemic.

85.Pandemic.
Infection that spreads rapidly over large areas of the world is known as pandemic.

86.Sporadic.
Infections that occur at irregular intervals or only in a few places is known as sporadic.

87.Bacteraemia.
Presence or circulation of bacteria in blood stream is called bacteremia

88.Septicaemia.
A systemic disease or blood poisoning in which microorganisms multiply in blood stream, form toxic products, producing clinical signs and symptoms such as fever.

89.Carrier.
Carrier is defined as a person who harbors pathogen without any clinical disease and acts as a potential source of infection for others. They can be healthy carrier, convalescent carrier, incubatory carrier, temporary carrier, chronic carrier.

90.Biological vector.
The pathogen multiplies in the body of the vector, often undergoing part of its developmental cycle before transmission. Such vectors are called biological vector.
Eg female anopheles mosquito –Malaria
Aedes aegypti mosquito—Yellow fever.
Rat flea—plague.

91. Difference between exotoxin and endotoxin

EXOTOXIN	ENDOTOXIN
Protein	Lipopolysaccharides
Heat labile	Heat stable
Strongly antigenic	Weakly antigenic
Can be converted into toxoids by inactivation with formaldehyde	Cannot be converted to toxoids.
Produced mainly by Gram positive bacteria and some by gram negative bacteria	Produced only by gram negative bacteria

92.Define immunity.
Immunity is the resistance exhibited by the host towards injury caused by microorganisms or their products.

93.Define innate immunity.
Innate immunity is the resistance, in which an individual possesses resistance by virtue of genetic or constitutional make up.
Eg. Africans are resistant to malarial infection (plasmodium falciparum) due to sickling nature of the RBCs.

94.Define active/acquired immunity.
When an individual is naturally or artificially exposed to infection or antigens, it results in stimulation of an active functioning of immune system leading to humoral immunity or cell-mediated immunity, called actively acquired immunity.

95.Give some examples of active immunity.
Natural active immunity---following an exposure to microbial infection (e.g.Measles viral infection).
Artificial active immunity—Following an administration of vaccines

96.Define passive immunity.
Passive immunity is received passively by injection of readymade preformed antibodies.
Eg. Transfer of antibodies through breast milk to newborn is natural passive immunity

97.Give some examples of passive immunity.
Natural passive immunity—involves transfer of maternal antibodies through secreted breast milk.
Artificial passive immunity—involves administration of ready-made immunoglobulins. Eg.hepatitis B immunoglobulin.

98.Difference between active and passive immunity.

Active immunity	Passive immunity
Produced by active functioning of the immune system	Received passively. No active involvement of immune system
Stimulated by infections, antigens	By administration of antibodies or sensitized T cells.
Not applicable in immunodeficient hosts	Applicable in immunodeficient hosts.
Provides effective and long-lasting immunity	Immunity is less effective and transient.

7.Antigen and Antibodies

99.Antigen.
Antigen is defined as any substance living or nonliving which when introduced parenterally into human or animal body stimulates the formation of opposite substances called antibodies with which it reacts specifically and in an observable manner.

100.Define hapten.
Haptens are substances which cannot induce formation of antibodies by themselves but can react with specific antibodies.
Eg.Capsular polysaccharide of pneumococci, Forssmann antigen.

101.Mention any two properties of antigen.
a.Antigenicity is directly related to the size of antigen molecules. Large molecules are strongly antigenic whereas low molecular weight substances are weakly antigenic.
b.Proteins and polysaccharides are antigenic and lipids and nucleic acids are weakly antigenic.

102.Super antigens.
Super antigens are proteins that stimulate the immune system much more extensively than do normal antigens. They can activate the T cells without being processed by antigen-presenting cells.
Eg.Staphylococcal enterotoxin-A.TSST-1(Staphylococcal toxic shock syndrome-type-1).

103.Immunoglobulins
Immunoglobulins are glycoproteins, synthesized by plasma cells and to some extent by lymphocytes. They are proteins of animal origin possessing antibody activity and for certain other proteins related to them by chemical structure.

104.Define antigen and antibody.
Antigen is defined as any substance living or non living which when introduced parenterally into human or animal body stimulates the formation of opposite substances called antibodies with which it reacts specifically and in an observable manner.
Antibodies are glycoprotein molecules that recognize a particular epitope on an antigen, bind specifically to it and finally facilitate the clearance of that antigen. They are secreted by plasma cells and are present on

the B cell membrane.

105.Types of antibody.
Antibodies are immunoglobulins. They are glycoproteins composed of four polypeptide chains, held together by disulfide bonds. There are five classes namely IgG, IgM, IgA ,IgD and IgE.

106.IgG
IgG is major immunoglobulin accounts for 80% of total Ig pool in serum. IgG is protective and long lasting antibody. It crosses the placenta. It is the major humoral line of defense.

107.IgM
IgM is the first antibody to be produced following an infection. It represents acute or recent infection. It is the first antibody to be synthesized in fetal life (20 weeks).

108.IgA.
IgA is known as secretory antibody. It is predominantly secreted in body secretions like milk, saliva, tears, intestinal and respiratory mucous secretions.

109.IgE.
IgE mediates type I hypersensitivity. IgE response is seen in various allergic conditions such as asthma, anaphylaxis, hay fever.

110.What is an adjuvant?. Give two examples.
Adjuvant refers to any substances that enchances the antigenicity of antigen. They delay release of antigen from site of injection and prolong antigenic stimulus.
Eg.Aluminium hydroxide or Aluminium phosphate
Freund's complete adjuvant.
Freund's incomplete adjuvant.
DPT contains diphtheria toxoid, pertusis and Tetanus toxoid. Pertusis is an adjuvant for diphtheria and tetanus.

111.Monoclonal antibody.
Antibodies produced by a single clone (a single antibody forming cell or a single B-lymphocyte/plasma cell) and directed against a single antigenic determinant are called monoclonal antibodies.

8.Antigen and Antibody reactions

112.Mention two antigen- antibody reactions.
Two antigen-antibody reactions are precipitation reaction and agglutination reactions.

113.Mention the types of antigen-antibody reactions.
Conventional techniques.
Precipitation reaction
Agglutination reaction
Complement fixation test.
Newer techniques.
ELISA (enzyme linked immunosorbent assay)
Immunofluorescence assay
Radioimmunoassay
Western blot

114.Precipitation reaction.
When a soluble antigen combines with its antibody in the presence of normal saline (Nacl) at a suitable temperature and pH, antigen-antibody complex forms an insoluble precipitate as a sediment or deposit. Eg.Ring test, VDRL slide test.

115.Agglutination test.
When an insoluble antigen combines with its antibody in the presence of normal saline (Nacl) at a suitable temperature and pH, antigen- antibody complex forms large clumps that can be seen with a naked eye.
Eg. Slide agglutination test for detection of blood grouping, Tube agglutination test--Widal test for the diagnosis of typhoid fever.

116.Passive agglutination test.
Precipitation test can be converted into an agglutination test by coating the soluble antigen on the surface of a carrier molecule.(e.g .RBC, Latex or bentonite) so that the antibody binds to the coated antigen and agglutination takes place on the surface of the carrier molecule.
Eg. ASO titre, RA factor test.

117. Give some examples of heterophile agglutination test.
Typhus fever(Weil Felix reaction)
Infectious mononucleosis(Paul Bunnel test)
Mycoplasma pneumonia (cold agglutination test)

118.Coomb's test.
Coomb's test is done to detect incomplete antibodies (non-agglutinating or antierythrocyte antibodies. There are two types of coomb's test. Anti -Rh antibodies when react with RBC (Coated on RBC) fail to produce agglutination. Addition of antiglobulin serum (Coombs serum)produced in the heterologous species (e.g. Rabbit antihuman gamma globulin), produces agglutination.

119.Give some examples of heterophile agglutination test.
Weil felix reaction and Paul bunnel test are examples of heterophile agglutination test.

120.ELISA
Enzyme linked immunosorbent assay (ELISA) is highly sensitive and less expensive technique used in serology to detect antigens or antibodies. Test involves linking of various labelled enzymes to either antigen or antibodies.

121.Uses of ELISA.
a.HIV detection
b.Infectious diseases like hepatitis, EBV, cytomegalo virus IgM/IgG
c.Rota virus detection in fecal specimens
d.Syphilis of IgM /IgG
e.Food toxins like chloramphenicol ,streptomycin.

122.Interferons
Interferons are antiviral agents which are now classified as cytokines.
There are three classes of interferons.
Alpha interferon produced by leukocytes.
Beta interferons produced by fibroblasts
Gamma interferons produced by T cells.

9.Hypersensitivity and Autoimmunity

123.Define and classify hypersensitivity.
Hypersensitivity is an exaggerated immune response which results in tissue damage in a sensitized individual on second or subsequent contact with specific antigen. Hypersensitivity is also termed as allergy.

124.Classification of hypersensitivity.
Immediate hypersensitivity (B cell or antibody mediated)
Anaphylaxis.
Atopy
Antibody-mediated cell damage
Arthus phenomenon
Serum sickness.
Delayed hypersensitivity (T cell mediated)
Tuberculin
Contact dermatitis.

125.Anaphylaxis.
Anaphylaxis is a systemic form of Type1 hypersensitivity. Antigens and haptens induce anaphylaxis. There should be an interval of 2-3 weeks between sensitizing dose and shocking dose.
Eg. Antibiotics (penicillin), insect venom from the stings or bee bites, antitoxins.

126.Atopy
Atopy refers to naturally occurring familial hypersensitivity, characterized by allergic rhinits (hay fever) and asthma. It is the localized form of type I hypersensitivity.
Allergens commonly involved are
Inhalants (air-borne allergens)—Pollen, fungal spores, dust smoke.

127.Give some examples of type I hypersensitivity.
Anaphylaxis and atopy are examples of type I hypersensitivity.

128.Give two examples of type II hypersensitivity.
Also known as cytotoxic and the reactin is mediated by IgG that react with cell surface or tissue antigens.
Eg.Haemolytic anaemia,Thromocytopenic purpura,Agranulocytosis.

129.Give two examples of type III hypersensitivity.
Also known as immune complex diseases as the damage is caused by antigen-antibody complexes. Arthus phenomenon and Serum sickness are two examples of type III hypersensitivity.

130.Type IV delayed hypersensitivity.
Type IV delayed hypersensitivity is mediated by specifically sensitized effector T lymphocytes and not by antibodies. Sensitized T lymphocytes on contact with specific antigen, release lymphokines, which attract lymphocytes, macrophages and basophils to affected tissue and results in extensive tissue damage. Eg Contact dermatitis, Mantoux test.

131.Define auto immunity.
Auto immunity is a condition in which the bodies own antibodies act against its self antigen resulting in structural or functional damage.

132.Mention two autoimmune diseases.
Systemic lupus erythematosus, Rheumatoid arthritis are two auto immune diseases.

133.Give some examples of tumor antigens.
Carcinoembryonic antigen in colonic carcinoma.
Alpha feto protein in hepatocellular carcinoma.

134.Graft – versus host reaction
Graft rejection is due to reaction of host to graft. But sometime the graft may initiate an immune response against host tissue, known as GVH reaction.

135.Autograft.
An organ or tissue taken form an individual and grafted on himself is auto graft.

136.Isograft.
A graft taken from an individual and placed on another individual of same genetic constitituin is called isograft.

137.Allograft or homograft.
Grafts between two genetically non identical members of same species ara called allografts.

138.Xenograft or heterograft.
Grafts between members of different species are called xenografts.

10.Gram positive bacteria and Gram negative bacteria

139.Give some examples of Gram positive bacteria.
Gram positive cocci—Staphylococcus aureus, Streptococcus pyogenes.
Gram positive bacilli—Clostridium perfingens, Clostridium tetani.

140.Give some examples of Gram negative bacteria.
Gram negative cocci—Neisseria meningitidis, Neisseria gonorrhoeae.
Gram negative bacilli—Escherichia coli, Klebsiella pneumoniae.

141.Name four anaerobic bacteria.
1.Baterioides fragilis
2.Clostridium tetani
3.Clostridium perfingenes
4.Peptostreptococcus

142.Write any three anaerobic infections.
Anaerobic infections are caused by anaerobic organisms.
Eg. Botulism –Clostridium botulinium
Tetanus—Clostridium tetani
Gas gangrene—Clostridium perfringens.

Clinical Microbiology (Infective syndrome)

11.Respiratory tract infections

1.Define respiratory tract infection.
The entry of microorganisms through nasal passages can result in upper respiratory tract and lower respiratory tract infection. Respiratory tract infections may occur in the nasopharynx, oropharynx, middle ear and paranasal sinuses, larynx, trachea, bronchi, bronchioles and lungs.

2. Name the organisms/bacteria causing Respiratory tract infection.
The organisms causing respiratory infections can be divided into
Upper respiratory tract infection: Streptococcus pneumoniae, Streptococcus pyogens, Haemophilus influenzae, Staphylococcus aureus, Gram negative bacilli.
Lower respiratory tract infection: Streptococcus pneumoniae, Haemophilus influenzae, Mycoplasma pneumoniae, Staphylococcus aureus, Chlamydia pneumoniae.

3. Name four bacterial organisms causing respiratory tract infections.
Streptococcus pneumoniae, Klebsiella pneumoniae, Mycoplasma pneumoniae, Coxiella burnetii.

4. What are the samples collected in lab diagnosis of respiratory tract infections?
Specimens collected
a. Throat swab—Sore throat, pharyngitis, tonsillitis.
b. Sputum—collected into a sterile, wide-mouthed container.
c. Pleural fluid—in lower respiratory tract infections
d. Blood- for blood cultures.

5.Name the viruses causing respiratory tract infections.
Upper respiratory tract infections
Rhinitis—Rhino virus, corona virus, Respiratory syncytial virus. (RSV)
Sinusitis—Rhinovirus, influenza virus, para influenza virus.
Lower respiratory tract infection—
Bronchitis—Parainfluenza virus, influenza virus, Hanta virus.
Pneumonia—Influenza virus, RSV, adenovirus.

6.Mention the clinical manifestations of upper respiratory tract infections.
Upper respiratory tract infections can present with tonsillitis, pharyngitis, sinusitis, rhinitis.
The clinical manifestations include cough, sore throat, running nose, nasal congestion, headache, low grade fever, facial pressure and sneezing.'

7.Mention the clinical presentations of lower respiratory tract infections.
The lower respiratory tract infections can present with bronchitis, bronchiolitis and pneumonia as there are infections of trachea, bronchi, bronchioles and the lungs.
They present with fever, cough, difficulty in breathing, chest pain which can be confirmed by X ray chest.

12.Meningitis

8.Define meningitis.
Meningitis is an inflammation of the meninges surrounding the brain and spinal cord. It implies to infection of subarachnoid space or the leptomeninges.

9.Define pyogenic meningitis.
Pyogenic meningitis is inflammation of the meninges which is usually caused by bacteria, characterized by acute inflammatory exudate with large number of pus cells (polymorphonuclear cells) in CSF.
Eg. Streptococcus pneumoniae, Group B streptococcus, Escherichia coli (in neonates).

10.Define encephalitis.
Encephalitis is an inflammation of brain parenchyma and is usually a result of viral infection.
Eg. Polio virus, Herpes virus.

11.Define aseptic meningitis.
Aseptic meningitis is inflammation of the meninges characterized by elevated lymphocytes in CSF. The common organisms involved are Mycobacterium tuberculosis, Cryptococcus neoformans and Herpes simplex virus 1 and 2.

12. Define brain abscess.
Brain abscess in localized collection of pus in a cavity formed by breakdown of tissue.

13.Name four causative agents of meningitis.
The four causative agents of meningitis are
1.Bacteria: Neisseria meningitidis, Haemophilus influenzae
2.Virus: poliovirus, measles virus, mumps virus.
3.Parasites: Naegleria species, Toxoplasma gondii.
4.Fungus: Cryptococcus neoformans.

14.what are the clinical manifestations of meningitis?
Symptoms: intense headache, high grade fever and altered sensorium, vomiting
Signs, Neck rigidity and Kernig's sign. Severe stiffness of the hamstrings causes an inability to straighten the leg when the hip is flexed.
Brudzinski's sign: Severe neck stiffness causes the patient's hips and knees to flex when the neck is flexed.

15.What is the sample collected in meningitis?
The sample collected is Cerebrospinal fluid in three sterile containers one each for cell count, biochemical analysis, bacteriological examination.

16.How do you differentiate bacterial, viral and tuberculosis infection in CSF analysis?
In pyogenic meningitis CSF analysis show marked rise in polymorpho neutrophils. Glucose is markedly reduced.
In viral meningitis, CSF analysis show moderate rise in polymorpho neutrophils.Glucose is normal
In Tuberculous meningitis, CSF analysis show marked rise in lymphocytes. Glucose is slightly reduced.

13. Enteric Infections

17.Define diarrhea.
Diarrhea is defined as passage of three or more loose or liquid stools-per day, in excess that the usual habitat of that person. It may be caused by microbial infections or as a result of other gastrointestinal diseases such as inflammatory bowel diseases, coeliac disease, etc.

18.Name four bacteria causing diarrhea.
a. Vibrio cholerae.
b. Escherichia coli
c. Salmonella typhi.
d. Clostridium difficile.

19.Name viruses causing diarrhea.
1.Rota virus
2.Norvovirus
3.Enteric adenovirus

20.Mention few parasites causing diarrhea.
a. Giardia lamblia
b. Cryptosporidium species
c. Cyclospora species.
d. microsporidia.

21.Name four types of diarrhea caused by E.coli
1.Entero pathogenic E.coli- causes diarrhea in infants and children
2.Entero toxigentic E.coli—causes travellers diarrhea
3.Entero invasive E.coli—resembles Alkalescens dispar
4.Entero hemorrhagic E.coli—range from mild diarrhea to fatal hemorragic colitis and hemorraghic uremic syndrome

22.Define Gastroenteritis.
Gastroenteritis is defined as inflammation of the mucous membrane of stomach and intestine resulting in combination of diarrhea, vomiting and pain abdomen with or without mucus / blood/fever/dehydration.
Eg.Staphylococcus aureus, Vibrio cholerae, Escherichia coli.

23.Define dysentery.
Dysentery is characterized by diarrhea with increased blood and mucus often associated with fever, abdominal pain and tenesmus.
Eg.Shigella species, Entamoeba histolytica

24.Name few agents causing dysentery.
Shigella species, Balantidium coli, Entamoeba histolytica.

25.How do you treat gastroenteritis?
Fluid correction to prevent dehydration and fluroquinolones, nalidixic acid are given.

26. Name four organisms causing gastroenteritis.
Salmonella typhimurium, Shigella spp. Clostridium difficile, Vibrio cholerae.

27.How do you prevent gastroenteritis?
Adequate boiling of water, maintain proper sewage disposal to prevent fecal contamination of water and hand wash before consuming food.

14. Cholera and Enteric fever

28.Enteric fever.
The term enteric fever includes typhoid fever caused by Salmonella Typhi and para typhoid fever caused by Salmonella ParaTyphi A, B and C.

29.Widal test
Widal test is a tube agglutination test done for the serodiagnosis of typhoid fever for the detection of antibodies of Salmonella typhi and paratyphoid fever.

30.Mention the causative agents of enteric fever.
Typhoid fever and paratyphoid fever together is known as enteric fever. S.Typhi causes typhoid fever. Salmonella ParaTyphiA and S.ParaTyphi B ,Salmonella ParaTyphi C causes paratyphoid fever.

31.Mention the tests done to detect typhoid fever.
Blood culture—during the first week of illness.
Widal test ---during the end of 1st week of illness
Stool culture—3rd and 4th week of illness.
Urine culture –3rd and 4th week of illness.

32.What are the antibodies detected in widal test?
S.Typhi O antibody, S.Typhi H antibody in case of S.Typhi.
S.Typhi O antibody ,S.Typhi AH antibody in case of S.ParaTyphi A.
S.Typhi O antibody, S.Typhi BH antibody in case of S.ParaTyphi B.

33.How do you interpret widal test?
For the diagnosis of typhoid fever there should be a rise in titre >1:100 of S.Typhi 'O "Antibody and >1:200 of H antibody .

34.Mention the clinical features of enteric fever.
Enteric fever is characterized by fever (step ladder pyrexia), anorexia, nausea, vomiting, abdominal pain, rose spots (occasionally), gastro enteritis.

35.Mention the selective medium for S.Typhi.
Wilson and Blair bismuth bisulphite medium is the selective medium for S.Typhi.

36.Salmonella food poisoning.
Salmonella food poisoning is of infectious type and the source of infection is usually animal products like meat,poultry,milk,creams ,eggs, salads and the causative agent is S.Typhimurium. They usually present with fever, abdominal pain with cramps, vomiting and diarrhea.

37.Mention the vaccines used for prophylaxis of enteric fever.
TAB vaccine- heat killed vaccine containing S.Typhi 1000million and S.Paratyphi A and B 750 million cells per each ml.
Typhim Vi—Contains purified Vi polysaccharide antigen in a a dose of 25ug from serotype S.typhi strain Ty-2.
Oral vaccine—Live oral vaccine .

38.What is the clinical presentation of chloera?.
Cholera is caused by V.cholerae through fecal contamination of water. Clinically they present with fever, abdominal pain, rice water stools diarrhea and with signs of dehydration.

39.Mention the transport medium of V.cholerae
a.Venkatraman-ramakrishnan medium
b.Cary-blair medium.

40.Name two transport medium for vibrio cholerae specimens.
Venkatraman-ramakrishnan medium, Cary-blair medium are two transport medium for Vibrio cholerae.

41.Mention the selective medium for V.cholerae
TCBS-Thiosulphate citrate bile salt agar,
BSA—Bile salt agar.

42.Give some examples of enrichment media for V.cholerae.
Alkaline peptone water, Monsur's taurocholate tellurite peptone water.

43.How will you describe the motility and morphology of V.cholerae?.
The bacilli is gram negative comma shaped bacteria and the motility is darting motility as it has single polar flagellum

44.Give some examples of halophilic vibrios.
V.parahemolyticus,V.alginolyticus, V.vulnificus.

45.Mention two differences between classical and Eltor vibrios.

TEST	CLASSICAL	ELTOR
Haemolysis	negative	positive
PolymyxinB sensitivity	positive	negative
Chick erythrocyte agglutination	negative	positive

46.Mention about cholera vaccines or prophylaxis of cholera.

Killed cholera vaccine—given in 2 doses with 1-4 week interval, SC or IM. Vaccine contains 8000 million V.cholerae per ml. composed of equal number of Ogawa and Inaba serotypes.

Non-living oral B subunit whole cell vaccine—heat killed whole cell V.cholerae O1 in combination with purified recombinant B subunit of cholera toxoid.

Live oral choera vaccine: consists of attenuated live oral genetically modified Cholerae O1 strain.

15.Urinary tract infections

47. Define urinary tract infection. How do you classify?

Urinary tract infection is defined as a disease caused by microbial invasion of the urinary tract that extends from the renal cortex of the kidney to the urinary meatus. UTI are broadly classified into upper and lower urinary tract infection.

Upper UTI involves kidney and ureter.

Lower UTI involves urethra and bladder.

48.Mention the organisms causing urinary tract infection.

Bacteria----- Gram negative bacilli---Escherichia coli, Klebsiella pneumoniae,

Gram positive cocci--- Staphylococcus saprophyticus, Staphylococcus aureus.

Virus--- Herpes simplex virus, Adeno virus

Fungus—Candida albicans

Parasites—Schistosoma haematobium, Trichomonas vaginalis.

49.Name four bacteria causing urinary tract infections (UTI).

1.Escherichia coli

2.Staphylococcus aureus

3.Pseudomonas aeruginosa

4.Enterococcus spp.

50.Mention the different methods of collection of urine sample.

a.Midstream urine collection

b.Suprapubic aspiration from bladder

c.In catheterized patients- urine aspirated from the catheter tube after clamping distally and disinfecting,but never collected from urine bag.

51.Define asymptomatic bacteriuria.

Asymptomatic bacteriuria refers to urinary tract infection in which typical clinical manifestations of urinary tract infection is not present.

52.Mention the clinical manifestations of urinary tract infections

Dysuria, Fever with chills and rigors, supra pubic tenderness.

53.Significant bacteriuria.
UTI may be defined as the presence and multiplication of bacteria in urine within urinary tract.Kass gave a criterion of active bacterial infection of urinary tract according to which a count exceeding 1lakh bacteria/mL denotes significant bacteria and indicates active UTI.

54.How do you treat urinary tract infection?
Treatment should be based on antimicrobial susceptibility report. Quinolones, nitrofurantoin , cephalosporins, and aminoglycosides are preferred.

16.Mycobacterium Tuberculosis

55.Give two examples of acid fast bacilli.
Mycobacterium tuberculosis, Mycobacterium leprae.

56.What are the other names for acid fast staining?
Acid fast staining is also known as Ziehl neelsen staining and it is used to stain Mycobacterium tubercle bacilli.

57.Mention the percentage of sulphuric acid used to decolourise Acid fast bacilli.
25% sulphuric acid for Mycobacterium tuberculosis.
5% sulphuric acid for Mycobacterium leprae.
1% sulphuric acid for Nocardia

58.Give me some examples of culture media for Mycobacterium tuberculosis.
Lowenstein Jensen media, Dorset egg media, Loeffler's serum slope are the culture media for Mycobacterium tuberculosis.

59.What is the composition of Lowenstein Jensen media?.
Lowenstein-Jensen media contains coagulated hen's egg, malachite green, glycerol, mineral salt solution, asparagine.

60.How many sputum samples are collected for the diagnosis of M.tuberculosis?.
Two sputum samples are collected—1.spot sputum sample and early morning sputum sample.

61.What are the clinical presentations of Pulmonary tuberculosis?.
History of cough >2weeks, evening rise of temperature, loss of appetite, loss of weight.

62.What are the modes of transmission of Mycobacterium tuberculosis?.
Mycobacterium tuberculosis is mostly transmitted by inhalation.Other routes of transmission are inoculation and ingestion.

63.Mantoux test.
Mantoux test or tuberculin test is an intradermal test to demonstrate delayed hypersensitivity to tuberculin protein.0.1ml of PPD containing 5TU in injected intradermally on the forearm with a tuberculin

syringe raising a wheat and examined after 2-3 days. Induration of diameter 10mm or more is considered positive.5mm or less – negative and 6-10mm-equivocal.

64.Mention the extrapulmonary manifestations of Mycobacterium tuberculosis.

Mycobacterium tuberculosis involve outside the lung and can present with TB lymphadenitis, TB meningitis, Genito urinary tuberculosis, Skeletal tuberculosis.

65.BCG vaccine.

Bacillus Calmette Guerin vaccine is an intradermal vaccine given soon after birth to prevent TB.

66.What is the treatment given for Mycobacterium tuberculosis?.

TB is treated with combination of drugs using INH,Rifampicin, Ethambutol,Pyrazinamide and Streptomycin and the treatment is given for a period of 6 months.(These are the first line of drugs). Second line of drugs include cycloserine, aminoglycosides, macrolides,quinolones, ethionamide (These drugs are in given if the patient develop resistance to first line of drugs and is given for a period of 18 months).

67.RNTCP of tuberculosis.(Revised National tuberculosis control programme)

Revised national tuberculosis control programme was implemented in India in 1992.The aim is to provide standardized treatment and proper diagnostic facilitites so that the patients get the full benefit free of cost. Treatment is provided by a DOT(direct observed treatment) provider at the DOTS(Directly observe treatment, short course) centre.

68.Define MDR (multidrug resistant) tuberculosis.

MDR is defined as resistance to INH and Rifampicin with or without resistance to other first line antituberculous drugs.

69.Define extensive drug resistant tuberculosis.(XDR-TB)

These are MDR TB cases which are also resistant to Fluroquinolones(ofloxacin, levofloxacin),and one of the injectable aminoglycosides (kanamycin,amikacin or capreomycin).

17.Leprosy and Miscellaneous infections

70.Name four atypical mycobacteria.

Mycobacterium kanasii
Mycobacterium avium
Mycobacterium scrofulaceum
Mycobacterium intracellulare.

71.Mention the clinical classification of leprosy.

Leprosy may be classified into 4 types.
Lepromatous
Tuberculoid
Dimorphous
Indeterminate

72.What is the percentage of sulphuric acid used to decolourise M.leprae?

5% sulphuric acid is used to decolorize Mycobacterium leprae.

73.How do you differentiate lepromatous leprosy from tuberculoid leprosy?.

Lepromatous leprosy	Tuberculous leprosy
Highly infectious	Less infectious
Lepromin test is negative	Lepromin test is positive
multibacillary	paucibacillary
Present with depressed nasal bridge ,claw hand, leonine facies	Hypo aesthetic patches with decreased sensation of nerves.

74.Lepromin test

Lepromin test is an intradermal test to detect delayed hypersensitivity test to leprae bacilli. The antigen used is Dharmendra's antigen or Depot lepromin.Lepromin test is not used to diagnose leprosy.Lepromin test is positive in tuberculoid leprosy.

18.Wound infections

75.Mention the clinical manifestations of Staphylococcal infections.
a.cutaneous infections boils, furuncle, abscesses, carbuncles, impetigo.
b.Repiratory tract infections Tonsillitis, pharyngitis, sinusitis.
c.Staphylococcal food poisoning. Caused by enterotoxin of Staphylococcus.
d.Staphylococcal scalded skin syndrome.
e.Toxic shock syndrome

76.Toxic shock syndrome.
It is caused by Staph aureus producing enterotoxin belonging to Phage group I. It is a super antigen. It is a multisystemic illness characterized by acute onset of fever, hypotension, vomiting, diarrhoea progressing to renal failure, disseminated intravascular coagulation and death.

77.Mention the bacterial agents causing wound infections.
Staphylococcus aureus, Streptococcus pyogenes, Clostridium perfingens, Pseudomonas aeruginosa.

78.Mention few viral agents presenting with wound infections.
Herpes virus—Molluscum contagiosum
Varicella zoster virus—vesicular lesions on the body. (chicken pox)
Herpes simplex virus—fever blister.

79.Name four organisms causing wound infections.
Bacteria : Streptococcus pyogenes, Staphylococcus aureus.
Virus: herpes zoster, Varicella zoster
Fungi: Dermatophytes, Sporothrix schenckii
Parasites: Cutaneous larva migrans.

80.Name the bacterial agents causing burn wound infections.
Staphylococcus aureus (may be MRSA).
Pseudomonas aeruginosa
Coagulase negative Staphylococcus, (S.epidermidis)

81.What are the clinical presentations of Streptococcus spp?.
Suppurative lesions—Erysipelas, Impetigo, necrotizing fasciitis.
Non suppurative lesions—acute rheumatic fever, Post streptococcal glomerulonephritis.

82.Rheumatic fever.
Rheumatic fever is non-suppurative lesion caused by Streptococcus pyogenes. Rheumatic fever follows persistent or repeated streptococcal throat infection. It is characterized by carditis which is an essential lesion in rheumatic fever.

83.Mention the clinical manifestations of Corynebacterium diphtheriae.
Corynebacterium diphtheriae present with pharyngitis with pseudomembrane formation on the tonsillar area, bull neck appearance, myocarditis, cutaneous lesions on the skin which is caused mainly by the diphtheroids bacilli.

84.Diphtheroids.
Corynebacteria resembling C.diphtheriae occur as commensals in the throat, skin, conjunctiva and other areas .Diphtheroids stain more uniformly that diphtheria bacilli and possess few or no metachromatic granules.eg. C.pseudodiphtheriticum,C.hofmanni.

85.Malignant pustule.
Malignant pustule is a skin manifestations caused by bacillus anthracis.It begins as painless papule that evolves into painless ulcer followed by coal- black necrotic escher surrounded by painless indurating edema.

86.Define gas gangrene.
Gas gangrene is defined as a rapidly spreading edematous myonecrosis, occurring in association with severe crushed wounds contaminated with pathogenic m clostridia mostly by Clostridium perfingens.

87.Mention the various clinical manifestations of gas gangrene.
There is sudden onset of excruciating pain at the site of injury associated with foul smelling sero sanguinous discharge, palpable crepitus along the muscle plain, and can present with shock and failure in late stages.

88.Describe the clinical manifestations of

tetanus.
The incubation period is 6-10 days. The first symptom is trismus or lock jaw.Later they present with painful spasm of extensor muscles can present with opisthotonos.

89.Describe the immunization schedule of tetanus toxoid in adults and children.
In children, tetanus toxoid is combined with DPT (diphtheria, pertusis, tetanus) toxoid, starting from 6th week as soon as the baby is born. 3 doses are given at an interval of one month and one booster dose at 18months of age. In adults, 4doses are given,2 doses at an interval of 1month followed by 2 booster doses at 1yr and 6 years.

90.Skin manifestations of Mycobacterium tuberculosis.
Lupus vulgaris and scrofuloderma are the skin manifestations of Mycobacterium tuberculosis.

91.Skin manifestations of Mycobacterium leprae.
Lepromatous leprosy present with leonine facies with claw hand, foot drop.
Tuberculoid leprosy present with hypopigmented lesions.

19.STD and Syphilis

92.Name four bacteria causing sexually transmitted diseases.
1.Treponema pallidum
2.Hemophilus ducrei.
3.Chlamydia trachomatis
4.Neisseria gonorrhea

93.Name viruses causing sexually transmitted diseases.
1.Herpes simplex virus 1 and 2
2.HIV
3.Hepatitis B virus

94.Name parasites causing sexually transmitted diseases.
Trichomonas vaginalis.

95.Name four organisms causing sexually transmitted diseases.
Treponema pallidum, Herpes simplex, Hepatitis B, Neisseria gonorrheae.

96.VDRL test.
Venereal disease research laboratory test is a serological test done for syphilis. It is a slide flocculation test and the antigen used is cardiolipin antigen.

97.RPR test.
Rapid plasma reagin is slide flocculation test used for the diagnosis of syphilis. It is a non specific serological test .The result can be read macroscopically as the antigen are coated with carbon particles.

98.When do you get biological false positive RPR test?
Biological false positive are seen in lepromatous leprosy, relapsing fever, malaria, viral hepatitis, tropical pulmonary eosinophilia.

99.Mention the disease manifestations of syphilis.
Primary syphilis- Hard chancre (pain less ulcer)
Secondary syphilis—skin rashes, condylomata, mucous patches
Tertiary syphilis—Gumma, neurosyphilis,Tabes

dorsalis.

100.Cliical manifestations of congenital syphilis.
Earliest manifestations: occur with in 2 years of age. Affected children are infectious and they suffer from rhinitis, mucocutaneous lesions, bone changes, hepatosplenomegaly, and lymphadenopathy.
Late congenital syphilis occurs after 2years and is characterized by interstitial keratitis, eight – nerve deafness, bilateral knee effusions (clutton's joints) ,notched central incisors.

101.Lympho granuloma venerum.
Lymphogranuloma venerum is caused by Chlamydia trachomatis (serovars L1,L2, L3) .It is an invasive systemic sexually transmitted disease characterized by
First stage—painless papule, ulcer on the penis or vulva after an incubation period of 3days to 6 weeks.
Second stage—bubo—tender, enlarged soft inguinal lymph nodes.
Third stage—Rectal stricture, recto vaginal or rectal fistula, elephantiasis of vulva.

20. Zoonosis

102.Define zoonosis.Give two examples.
Zoonoses are disease and infections of animals, Their causative agents are transmitted between animals and humans.
Eg.Anthrax, Plague, Brucellosis.

103.Name four bacterial causes of zoonotic diseases.
Anthrax, Brucellosis, Plague,leptospirosis,Bovine tuberculosis.

104.Name four viral causes of zoonotic diseases.
Rabies, yellow fever,chikungunya, Japanese encephalitis.

105.Name parasitic causes of zoonotic diseases.
Toxoplasmosis, Hydatid disease, Leishmaniasis.

21.Immunoprophylaxis

106.Vaccine.
Vaccine is an immunobiological preparations that provides specific protection against a given diseases.Following vaccination, the immunogen stimulates the immune system of the body to produce active immunity in the form of protective antibody immune competent T cell response.

107. Give some examples of live vaccines.
Measles vaccine
MMR (measles, mumps, rubella) vaccine
Oral polio vaccine
Hepatitis A vaccine

108.Advantages of live vaccines.
Live vaccines retain all the immunogenic components of the organisms.
They are capable of inducing mucosal immunity by stimulating secretory IgA antibody production at the local mucosal sites.

109.Contraindications of live vaccines.
Live vaccines should not administered in individuals with immunodeficiency.
It is also contra indicated in pregnancy.

110.Give some examples of killed vaccines.
Typhoid vaccine, Injectable polio vaccine,Pertusis vaccine.

111.Advantages of killed vaccines.
Killed vaccines can be given in individuals with immunodeficiency.
They can be given in pregnant patients.

112.Disadvantages of killed vaccines.
Needs multiple doses to establish immunity.
Less efficacy and the duration of immunity is not long lasting.

112. Give some examples of toxoid.
The exotoxins produced by certain bacteria can be detoxicated to form toxoid by treating with acidic pH, formalin.
Eg.DT (Diphtheria, tetanus, toxoid)
TT (Tetanus toxoid)

113.Measles vaccine.
Measles vaccine is a live attenuated vaccine given by subcutaneous route for the prevention of measles at 9th month. It can also be combined with MMR at 15 months of age. The vaccine is a free dried vaccine.

114. Name the virus and the vaccines of Measles.
Measles virus is a Paramyxovirus (RNA virus).The vaccines of measles virus is given as Measles vaccine .It is a live attenuated vaccine given by subcutaneous route at 9 months of age .It can also be given as MMR (measles, mumps and rubella) at 15 months of age.

115.MMR vaccine.
MMR vaccine is a live attenuated vaccine for protection against measles, mumps and rubella.The injection is given by subcutaneous route at 15 months of age.

116.DPT vaccine.
DPT vaccine is used for immunization for the prevention of childhood infections like diphtheria, pertussis and tetanus. It contains diphtheria toxoid, tetanus toxoid, Bordetella pertussis bacilli.

117.BCG
BCG is Bacillus Calmette-Guiren vaccine is used for immunization against Mycobacterium tuberculosis. The dose is given by intradermal route to the new born.

118.Cold chain.
Cold chain refers to a system of transport, storage and handling of vaccines,starting at the manufacturer level and ending with the site of administration of the vaccine to the client. The optimum temperature for refrigerated vaccines is between +2 deg C and +8 deg C. For frozen vacccines the optimum temperature is -15 deg C or lower.

22.Hospital acquired infectiona and Universal Safety precautions

119.Define hospital acquired infection.

Hospital acquired infection also known as nosocomial infections are infections which are not present at the time of their admission and develop infections 48 hrs after their admission in the hospital.
Common organisms causing hospital acquired infection is Klebsiella pneumoniae, MRSA (methicillin resistant Staphylococcus aureus).

120.Mention the different types of nosocomial infections.

Urinary tract infection
Respiratory tract infection
Blood stream infections
Surgical site infections.

121.Name the organisms causing hospital acquired infections.

1.Klebsiella pneumoniae
2.Staphylococcus aureus
3.Pseudomonas aeruginosa
4.Acinetobacter baumanii.

122.Biomedical waste.

Bio medical waste according to rule 1998, of India is any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities.

123.Name the method of treatment of biomedical waste.

Incineration, autoclave, chemical disinfection, Microwaving, sanitary land fill.

124. Mention the color coding ,and type of container used for disposal of biomedical waste.

Color coding	Waste category	Treatment options
Yellow	Infectious non plastic waste	Incineration/deep burial
Red	Infectious plastic waste	Autoclaving/microwaving/chemical treatment
Blue	Ampuoles,vials	Microwaving
White	Needles	Puncture proof container.
Green	General waste	Hand over to corporation

125.Name two infectious waste.

Yellow bag,(non chlorinated bag)Infectious non plastic waste which includes surgical gauzes, pads, animal tissues, human anatomical waste.
Red bag(non chlorinated bag). Infectious plastic wastes which includes catheter bags, IV sets, Syringes.

126.Universal safety precautions.

Universal safety precautions include Personal protective equipment which are worn by health care workers to protect them from infections which can be transmitted to them from patients which are blood borne like Hepatitis B , HIV and Hepatitis C.
They include mask, gloves, cap, gown, goggles, foot cover.

127.How do you manage accident spill over in the lab?

As soon as spill overtakes place, keep a no entry sign board. Wear PPE and mark the area with a chalk. Pour freshly prepared 1% hypochlorite and cover the area with with gauze. Keep it over for 20 minutes. Collect it and throw it in yellow bag. Clean the area with regular disinfectant again.

128.Needle stick injury.

As soon as needle stick prick takes place,wash the wound with running water till the bleeding stops. Do screening for Hepatits B, HIV and Hepatitis C at an intervals of 0,2,6 weeks, 3months and 6 months. If the source of prick is not known anti retroviral therapy should be started within 24 hrs for a period of 28 days.

23.Pathogenic Yeast and Fungi

1. Classification of fungi.
The morphological classification of fungi
1.yeast –eg Cryptococcus
2.Yeast like fungi—Eg. Candida spp.
3.Filamentous fungi----.Eg Dermatophytes.
4.Dimorphic fungi --dual forms both yeast and filamentous form e.g Histoplasma capsulatum, Blastomyces dermatiditis.

2.Name any two superficial fungal infections
Pitriyasis versicolor caused by Malassezia furfur
Dermatophytosis caused by Trichophyton, Microsporum and Epidermophyton spp.

3.Name any two subcutaneous fungal infections.
Mycetoma,Rhinosporidiosis are chronic subcutaneous fungal infections.

4.Name four fungi causing systemic mycoses.
Four fungi causing systemic mycoses are
1.Histoplasma capsulatum
2.Blastomyces dermatitidis
3.Coccidioides immitis
4.Paracoccidioides brasiliensis.

5.Give some examples of opportunistic mycoses.
Candidiasis caused by Candida albicans.
Cryptococcosis caused by Cryptococcus neoformans
Aspergillosis caused by Aspergillus species.

6.Dermatophytes.
Dermatophytes are keratinophilic fungi which are capable of infecting skin, hair and nails. The species include Trichophyton,Microsporun,Epidermophyton.

7.Mention the infections caused by dermatophytes.
The infections caused by dermatophytes are called dermatophytosis. The infections caused by them are called ring worm or tinea. Based on the site involved, they can cause Tinea versicolor, Tinea corporis, Tinea piedra etc.

8.Name four antifungal agents.
Griseofulvin, Amphotericin B,imidazoles(clotrimazole, miconazole),nystatin.

9.Oral thrush or Candidiasis.
Oral thrush is an infection of the mucous membrane of the mouth caused by an yeast like fungus called Candida albicans.

10.Clinical manifestations of Candidiasis.
Mucosal candidiasis—oral thrush presents as white, adherent, painless patches in the mouth.
Cutaneous candidiasis—intertrigo, paronychia.
Disseminated candidiasis—
Meningitis.

11.Lab diagnosis of Candidiasis.
Gram stain –Gram positive oval budding yeast cells with pseudo hyphae.
Germ tube test – positive for Candida albicans.

12.Treatment of Candidiasis.
Cutaneous candidiasis or oral thrush: the drug of choice is topical azole.
Esophageal and vulvovaginal candidiasis: the drug of choice is oral fluconazole.
Disseminated candidiasis: the drug of choice is amphotericin B.

24.Viruses - Introduction

1.Classification of viruses.
Viruses are classified into
1.DNA virus : Pox virus, Herpes virus, Adenovirus
2.RNA virus: Polio virus, Rhabdo virus, Influenza virus.

2.Examples of RNA virus.
Polio virus, Influenza virus, Rhabdo virus, Measles virus, Rubella virus.

3.Give some examples of DNA virus.
Pox virus, Adeno virus, Herpes virus, Papavo virus.

4.Give some examples of enveloped virus.
Herpes virus, Pox virus, HIV virus, Influenza virus.

5.Give some examples of non enveloped virus.
Picorna virus, Hepatitis A virus, Adeno virus, Parvo virus.

6.Symmetry of virus.
Virus has three kinds of symmetry
Icosahedral –eg Polio virus,herpes virus
Helical symmetry—measles virus
Complex symmetry---pox virus.

7.Shape of the virus.
Rabies virus—bullet shape
Ebola virus----filamentous shape
Pox virus—brick shape
Adeno virus---space vehicle shape.

8.Prions
Prions are proteinaceous infectious particles. They are capable of causing neurological degenerative disease of humans like scrapie, Kuru and Creutzfeldt-Jakob disease.

9. Interferons.
Interferons are group of proteins elaborated by virus infected cells in vivo which react with uninfected cells so as to render them resistant to infection with viruses. Interferons are used in prophylaxis and treatment of viral infections. They are used against hepatitis B and hepatitis C infections and also used as anticancer agent, particularly in lymphomas.

10.Cultivation of virus.
Virus cannot be grown in an artificial media like bacteria. They can be cultivated by inoculation into egg, animal inoculation and can also be cultivated by tissue culture.

11.Route of egg inoculation of virus.
Different routes of egg inoculation for the cultivation of virus are
1.chorioallantoic membrane—pox virus to produce pocks
2.allantoic cavity—influenza and paramyxo virus
3.amniotic sac—influenza virus
4.yolk sac---chlamydiae, rickettsiae

12.How will you assess the growth of virus?.
The growth of virus can be assessed by cytopathic effect, viral interference, Hemadsorption, immuno fluroscence assay, electron microscopy.

13.Inclusion bodies.
Inclusion bodies are aggregates of virions or viral proteins and other products of vial replication that confer altered staining property to the host cell. They can be intracytoplasmic or intranuclear.
Eg.Intracytoplasmic inclusion body.(Negribodies in Rabies virus,Guenieri bodies in pox virus).
Intranuclear inclusion body.(Cowdry type A and Cowdry type B inclusion body in Herpes virus).
Both intra nuclear and intra cytoplasmic inclusion bodies are seen in measles virus.

25.Herpes Virus

14.Classify/enumerate Herpes viruses.
Herpes viruses are divided into 3 families
Alpha herpes viridae: Herpes simplex virus type 1 and 2, Varicella zoster virus.
Beta herpes viridae: Cytomegalo virus, Human herpes virus type 6 and 7.
Gamma herpes viridae:Epstein -Barr virus, human herpes virus type 8.

15.Herpes virus.
Herpes virus are enveloped DNA virus with a tendency to cause latent infection in sensory nerve ganglion.

16.Mention Infections caused by herpes zoster virus.
Varicella zoster virus cause chicken pox and shingles (as a result of reactivation of virus).

17.Mention the clinical manifestations of chicken pox.
Chicken pox presents with fever with Vesicular rashes in various stages starting from face and on the trunk ,spread rapidly to involve the flexor surface (centripetal distributions).Rashes appear in multiple crops.

18.Shingles.
Shingles also known as zoster occur due to reactivation of latent varicella zoster virus in old age >60 years of age, in immunocompromised individuals. It usually starts with severe pain in the area of skin or mucosa supplied by one or more groups of sensory nerves and ganglia.

19.Prophylaxis of chicken pox.
Live attenuated vaccine using Oka strain is given in 2 doses.1st dose is given at 12-15 months of age and second at 4-6 years.

20.Manifesation of Epstein barr virus.
Epstein barr virus is associated with several human tumors including Hodgkin's disease, Burkitt's lymphoma, B Cell lymphoma.

21.Paul bunnel test.
Paul bunnel test is a heterophilic agglutination test done in infectious mononucleosis using sheep RBC's to detect heterophilic antibodies in patient's serum.Agglutination titre of >256 is considered significant.

22.Manifestations of Cytomegalo virus.
Cytomegalovirus is associated with congenital defects which include microcephaly, cerebral calcifications Intra uterine growth retardation, prematurity.

23.Inclusion body in Cytomegalo virus.
Owl eye inclusion body is seen in cytomegalo virus.

24.Roseola infantum
In children Human herpes virus 6 causes Roseola infantum. It is characterized by high grade fever and skin rashes.

26.Poliomyelitis

25.Polio virus.

Polio virus belong to family Picorna viridae and has got Icosahedral symmetry. It contains positive sense RNA virus and there are three antigenic types of polio virus which is responsible for disease namely type 1, type 2 and type 3.

26.Clinical manifestations of polio.

Polio is a viral disease mainly affects children and the infection is transmitted by fecal and oral route. They present with asymptomatic manifestation to descending asymmetric flaccid paralysis.

27.Name two polio vaccines.

Sabin vaccine—live attenuated polio vaccine (given as polio drops by mouth)
Salk vaccine—Heat killed polio vaccine (given as injection on the anterolateral aspect of the thigh.

28.Oral polio vaccine schedule in India.

Oral polio vaccine is recommended under national immunization schedule. It is administered orally (2drops/dose) .Total five doses are given. Zero dose at birth.1st/2nd/3rd doses given at 6/10/14 weeks.Booster dose given at 16-24 months of age.

29.Advantage of oral polio vaccine (Sabin vaccine)

Advantage of oral polio vaccine is that easy to administer and efficacy is achieved with two or more doses. (90-100%).The vaccine also provides both local or mucosal immunity and herd immunity.

30.Disadvantage of oral polio vaccine.

Oral polio vaccine cannot be given in immune compromised individuals, pregnancy and old age.

31.Inactivated polio vaccine (Salk vaccine).

Salk vaccine is given by intramuscular route in 4doses.The first 3 doses are given with 1-2 months gap and the 4th dose given at 6-12months after the 3rd dose.

32.Advantage of Inactivated polio vaccine.

Inactivated polio vaccine produce systemic immunity. The vaccine can be given in immunocompromised people and the vaccine is more stable and does not require stringent storage condition.

33.Disadvantage of inactivated polio vaccine (salk vaccine).

The disadvantage of salk vaccine is that it does not produce herd immunity and does not produce local or mucosal immunity.

34.Pulse polio immunization.

Pulse polio immunization was initiated to eradicate polio globally. Two rounds of pulse polio immunization are scheduled every year during winter season where all children under the age of five years are vaccinated with OPV irrespective of their OPV vaccination status.

35.What is the present status of Polio in India?

India has been declared polio- free since January 2014,the last natural cases was detected in 2011.

27.Rhabdovirus

36.Rhabdovirus.
Rhabdo virus is a bullet shaped RNA virus belong to family Rhabdo viridae.It is a negative sense RNA virus and is an enveloped virus.

37.What is the mode of transmission of Rabies virus?.
Rabies virus is a zoonotic disease. The disease spread from animals to human through the bite of an infected animal .Dog bite is the most common route.

38.Clinical manifestations of Rabies?.
Incubation period ranges from 20- 90 days. Early stage of illness present with fever, malaise, anorexia, vomiting. Acute neurological stage present with anxiety, confusion, hyperactivity, hydrophobia or aerophobia. These symptoms are probable due to dysfunction of infected brainstem neurons. Following acute neurological phase, patient develops coma that eventually leads to death within 14 days.

39.Negribodies.
Negribodies is an intracytoplasmic inclusion bodies seen in Rabies. Most common sites are neurons of cerebellum and hippocampus.

40.Post exposure prophylaxis of Rabies.
Post exposure prophylaxis include local wound care and both active and passive immunization.
All bite wounds and scratches should be washed thoroughly with soap and water.The vaccination schedule include 5 doses ,1ml each given on 0.3.7.14 and 28 days on the deltoid region.Day 0 indicates the date of administration of first dose of vaccine
Passive immunization is given with human rabies immunoglobulin 20IU/kg. given locally at the site of exposure.

41. Give examples of neural and non- neural Rabies vaccines.
Neural vaccines---Semple vaccine, Beta propiolactone vaccine, Infant mouse brain vaccine.
Non-neural vaccine—Purified duck embryo vaccine, Live attenuated embryo vaccine, Cell – culture derived vaccine- Vero cell vaccine, Human diploid cell vaccine.

28.Hepatitis

42.Hepatitis.
Hepatitis refers to inflammation of the liver. It can be caused by viruses, drugs, alcohol or metabolic disorders.
Eg Hepatitis A, Hepatitis B, Lass fever, yellow fever.

43.Name the types of Hepatitis viruses.
Hepatitis A
Hepatitis B
Hepatitis C
Hepatitis D
Hepatitis E
Hepatitis G

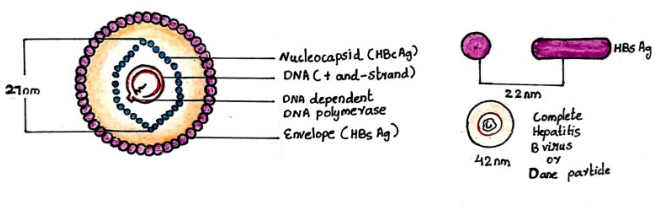
44.Name the hepatitis virus spread by fecal oral route.
Hepatitis A and Hepatitis E spread by fecal oral route.

45.Name the hepatitis virus transmitted by parenteral route.
Hepatitis B and Hepatitis C are transmitted by parenteral route.

46.Clinical manifestations of Hepatitis A.
Hepatitis A is transmitted by fecal oral route. They present with fever, nausea, vomiting, tired ness, dark urine, yellowish sclera and mucus membrane.

47.Prevention and prophylaxis of Hepatitis A.
Live attenuated vaccine is given to all children after 12months of age. Single dose is administered by intramuscular route followed by a booster at 6-12months of age.

47.Draw and label the diagram of hepatitis B virus.



29.HIV Virus

49.Modes of transmission of Hepatitis B virus.
Hepatitis B virus is transmitted by parentral route. Most common mode of transmission is blood and blood products, sexual transmission, vertical transmission from mother to babies, sharing of razors, syringes etc.

50.Mention the viral antigens of Hepatitis B.
Hepatitis B surface antigen (HBs Ag), Hepatitis B core antigen (HBc Ag), Hepatitis B pre core antigen (HBe Ag)

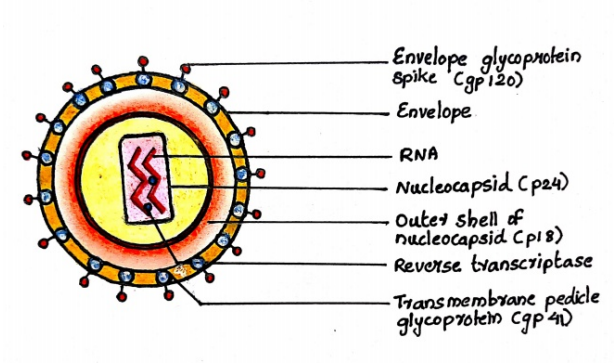
51.Name the hepatitis B serological markers.
The serological markers are HBs Ag , anti HBc IgM, anti HBc IgG HBe Ag or anti HBe IgM, HBV viral DNA.

52.Which is the first serological marker to appear in Hepatitis B?.
Hepatitis B surface antigen is the first serological marker to appear in Hepatitis B.

53.Prophylaxis of Hepatitis B.
Active immunization: Hepatitis B vaccine given by intramuscular route on the deltoid aspect of the arm. Dose 1ml in adults and 0.5ml in children. Given in 3 doses at 0,1 and 6 months.
Passive immunization: Human Hepatitis B immunoglobulin is given as a dose of 0.05-0.07mL/kg body weight within 6 hours of exposure and not later than 48 hours.

54.General preventive and prophylactic measures of Hepatitis B.
Screening of blood bags, semen and organ donors
Following safe sex practices (e.g. using condoms, avoiding multiple sex partners).
Following safe injection practices
Health education.

55.Draw the diagram and label the parts of HIV.



56.HIV virus.
HIV virus is an enveloped RNA virus. The envelope is made up of
Lipid part: It is host cell membrane derived
Protein part: It has got two components.
Glycoprotein:120gp : projected as knob like spikes on the surface and Glycoprotein 41.they form anchoring transmembrane pedicles.
Nucleo capsid is icosahedral in symmetry, contains two identical copies of single- stranded positive sense linear RNA.

57.Mention the genes of HIV
HIV contains three structural genes-
Gag—codes for the core and shell of the virus.It is expressed as a precursor protein, P55,
Which is cleaved into three proteins.
P17 constitutes the matrix or shell antigen
P24 and p15 –constitute the core antigen.
Pol—codes for viral enzymes such as reverse transcriptase, protease and integrase.
It is cleaved into proteins,p32,p51 and p66.
Env gene codes for the envelope glycoprotein which is cleaved into two components.
gp 120 which is the main receptor that binds to CD4 molecules on host cell to initiate infection .
gp 41 is the fusion protein.

58. Mode of transmission of HIV virus.
HIV virus is transmitted by sexual contact, transfusion of infected blood and blood products, sharing of contaminated needles and syringes, vertical transmission from mother to child in uterus or during birth or during breast feeding.

59.Mention the two sero types of HIV that can cause infection.
HIV 1 and HIV 2 are the two sero types that can cause infection.

60.Clinical manifestations of HIV.
The natural course of HIV infection passes through the following stages.
Acute HIV disease
Asymptomatic stage
Persistent generalized lymphadenopathy
Symptomatic HIV infection (AIDS[acquired immune deficiency syndrome) related complex)
AIDS.

61.What is the time duration to develop from HIV to AIDS?
It takes approximately 10 years to develop from HIV to AIDS.

62. Name four opportunistic infections in HIV.
Protozoa—Toxoplasma gondii
Fungi—Candida albicans
Bacteria—Mycobacterium tuberculosis
Virus—Cytomegalo virus

63.Name any two opportunistic infections in AIDS.
Opportunistic infections caused by
Fungi—cryptococcus neoformans
Helminthes—Strongyloides stercoralis.

64.Brief about NACO (National AIDS control organization).
NACO has been constituted to implement the HIV/AIDS control programme in India.It has formulated a strategic plan for HIV diagnosis.There are four strategic plan
Strategy 1. It is done for transfusion and transplantation purpose.
Strategy2.It is done for seroprevalence or epidemiological purpose
Strategy 3. It is done for the diagnosis of AIDS in symptomatic patients.
Strategy 4.It is done for the diagnosis of asymptomatic HIV patients, antenatal screening and screening of patients awaiting surgeries.

65.Mention the various tests done for HIV.
Specific tests for HIV detection include
ELISA—takes 2-3 hours.
Rapid – Simple test takes < 30 minutes.
Supplemental test for antibody detection which include
Western blot assay.
Immune fluorescence assay
Confirmatory test which include,
P24 antigen detection
Viral culture- by co-cultivation method.
HIV RNA (best confirmatory method)
Reverse transcriptase PCR.

66.What are all the antigens used in screening tests of HIV?
Antigens used in most of the screening tests
HIV-1 specific (p24, gp120,gp41,gp160)
HIV-2 specific gp36.

67.Different type of ELISA kits use for screening for HIV?
1st generation ELISA: uses crude preparation of HIV antigens.
2nd generation ELISA: uses recombinant antigen of HIV
3rd generation ELISA: uses synthetic oligopeptide antigens of HIV
4th generation ELISA; detects both HIV antibodies and antigen (p24) by using combination of recombinant synthetic peptides as well as monoclonal antibodies.

68.Important care taken while doing screening test for HIV.
We need to follow 3Cs while performing the test for HIV>
Consent in written format should be taken before the test is done. Confidentiality of the report should be maintained. Counselling should be provided to motivate the individual to tell the spouse/family and induce behavioural change.

69.NACO guidelines for post -exposure

prophylaxis.

The source of material usually blood, body fluids or othe potentially infectious material (CSF,synovial, pleural, pericardial and amniotic fluid).

Exposure code	HIV status code	Regimen
1	1	Not required
1	2	Basic
2	1	Basic
2	2	Expanded
3	1or2	expanded
2 or 3	unknown	Basic

Exposure code 1—mild exposure (mucous membrane/non- intact skin exposure with small volume, or less duration.
Exposure code 2- moderate exposure (mucous membrane/non- intact skin with large volumes,splashes for several minutes or more duration
Exposure code 3—severe exposure : percutaneous exposure with large volume, by hollow needle, deep puncture, visible blood on device, needle used in patient's artery or vein.
Source HIV status, code (SC)
SC-1, HIV positive, asymptomatic, CD4 T cell count high,low viral load.
Sc-2, HIV positive, symptomatic (advanced AIDS or primary HIV infection, CD4 T cell count low, high viral load.
SC unknown: Source unknown.
Basic regimen: for 4 weeks : 2 drugs NRTIs (nucleoside reverse transcriptase inhibitors)
Expanded regimen: For 4 weeks: 3 drugs(2NRIs+1PI)(nucleoside reverse transcriptase inhibitors + protease inhibitors).